

Validation of *Brief Affective Neuroscience Personality Scales* in normal populations

Walidacja skali *Brief Affective Neuroscience Personality Scales* u osób zdrowych

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Abstract

Aim of the study: To evaluate the psychometric properties of *Brief Affective Neuroscience Personality Scales* (BANPS).

Material and methods: For this purpose, 326 normal participants were selected, then the *Brief Affective Neuroscience Personality Scales: Negative and Positive Affect Scale* (NAPAS) and the *Emotion Awareness Questionnaire* were distributed among them to respond. The reliability of the Questionnaire was evaluated by Cronbach's α , retest, and split-half coefficient, and then the criterion validity with other questionnaires was evaluated to determine the psychometric properties of the BANPS. The factor structure was assessed via confirmatory factor analysis.

Results: The results of the factor analysis indicated that BANPS has six factors, and checking the reliability by using Cronbach's α , retest and split-half coefficient reflects the stability of the scale and the criterion validity of the BANPS with other questionnaires showed desirable discriminant and convergent validity.

Conclusions: Overall, the findings indicated that BANPS has good psychometric properties in normal samples, and the scale can be used in studies in normal samples.

Key words: affective neuroscience, factor analysis, reliability, validity.

Introduction

There are individual differences in temperament and mood that reflect emotional differences (Rothbart, Ahadi, and Evans 2000). It is believed that these emotional systems are shaped by evolution (Panksepp 2012). Although everyone has elemental knowledge of emotion, trying to define emotions is difficult; emotion refers to a wide variety of responses that can range from mild to severe, from positive to negative, from general to private, from short to long term, primary (primary emotional response), to secondary (converting a reaction emotion to another emotional response) (Kring and Sloan 2010).

Based on the functional perspective, emotions include adaptive responses to life problems and opportunities, in general, contemporary theories of emotion emphasise the role and importance of emotions in providing physiological, behavioural, and motor responses, facilitating decision making and promoting memory for important

incidents and interpersonal interactions (Gross and Thompson 2007).

Individuals show different emotional responses and vary in the rate of being susceptible to positive and negative excitement (Watson, Clarke, and Hawkins 1994), which reflects individual differences in the cognitive processing of received information. Given what has been said, emotions play an important role in different aspects of life, such as adaptation to life changes and stressful events. The results of the research show that emotions at any moment affect the attention (Vulliomir 2005), memory, and physiological responses. Emotional disturbance is the main factor of many dimensions of psychopathology (Kring 2008). Accordingly, negative emotions or the unpleasant consequences of such emotions have been reported in a range of different psychopathology problems (Surawy, Hackmann, Hawton, and Sharpe 1995; Ali *et al.* 2000), somatisation disorders (Woolfolk and Allen 2007), eating disorders (Corstorphine

2006), depression (Cramer, Gallant, and Langlois 2005), and Post Traumatic Stress Disorder (PTSD) (Ehlers and Clark 2000).

Over the past decades, an explosion of interest in emotional processes in psychology has been created, and as a result, researchers have focused more on the emotional dimension. Given that individual differences in initial emotions have an important impact on personality. An important step in the test of this hypothesis is the existence of desirable and valid scales. Accordingly, various scales have grown to measure emotional dimensions; one of the known scales in this area is the *Brief Affective Neuroscience Personality Scales* (BANPS; Davis, Panksepp, and Normansell 2003). A short version of this scale has been shaped by Barrett, Robins, and Janata (2013). This scale involves six major emotions: Play, Anger, Seek, Care, Fear, and Sadness. This study aimed to validate a measure of brief BANPS and examined the internal reliability and validity of the scale in the normal population.

Material and methods

Procedures

The participants comprised 326 samples. In this way, the research data were collected from the samples during one month. Of the total participants, 248 were undergraduates (76/1%) and 78 had master's degrees and higher (23.9%).

In order to collect data, the researcher had a meeting with the participants and gave the necessary explanations and then distributed the BANPS, *Negative and Positive Affect Scale* (NAPAS), and *Emotion Awareness Questionnaire* among them.

Measures

Brief Affective Neuroscience Personality Scales: This scale is designed to measure the six main dimensions of behavioural traits associated with the brain-nervous system (play, seek, care, fear, anger, and sadness) and is scored based on the five-point Likert scale. The neurobiological system underlying this scale is an animal model (Barrett, Robins, and Janata 2013).

In order to provide the Persian version of the BANPS, the researcher and two experts in English language translated the questionnaire into fluent Persian and then the translated text was edited. At the next step, the translated version was turned into English language again by the researcher and the two language experts, and after that the two versions were reconciled. To

examine the face validity, the questionnaire was then given to two psychologists. After reconciling the two translated and main versions and eliminating the mistakes, the questionnaire was conducted on 40 university students who were similar to the study final population, and after receiving essential feedback on the items' content and fixing the raised weaknesses, the final version of the questionnaire was prepared for use.

Emotion Awareness Questionnaire: This questionnaire is used to measure emotional awareness dimensions and has 30 items and six sub-scales and is scored based on the three-level Likert scale. The Cronbach's α coefficients for the subscales of this questionnaire $\alpha = .64$ to $\alpha = .68$ were obtained (Rieffe *et al.* 2007).

Negative and Positive Affect Scale: This questionnaire was designed to measure the positive and negative affect dimensions and includes 12 items and two subscales of positive affect and negative affect (Mroczek and Kolarz 1998). The questionnaire is scored on a five-point Likert scale from 1 to 5, Cronbach's α coefficients for both positive and negative subscales was obtained $\alpha = .91$ and $\alpha = .84$, respectively (Joshanloo 2017).

Ethical provisions

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments, or comparable ethical standards. The Institutional Review Board of Baqiyatallah University approved this study. Informed consent was obtained from all individual participants included in the study.

Data analytic strategy

SPSS version 22 (SPSS IBM, New York) and LISREL software (Jöreskog and Sörbom 2006) were used to perform statistical analyses. Bivariate correlations, Cronbach's α , split-half and test-retest coefficients, and confirmatory factor analysis were assessed to examine the convergent validity, internal consistency, and factor structure of BANPS.

Results

Validity

The BANPS validity was examined by two means; the criterion validity (conducted simultaneously with the NAPAS and *Emotion Awareness*

Questionnaire) and the correlation between subscales. The results are shown in Table 1.

The pattern of correlation coefficients between the subscales in Table 1 shows there is good internal consistency between the subscales. The pattern of correlation coefficients between the subscales with NAPAS and *Emotion Awareness Questionnaire* indicates the concurrent criterion validity of BANPS.

Reliability

To investigate the reliability of the BANPS, Cronbach's α , split-half, and test-retest coefficients were calculated. The 33-question scale's Cronbach's coefficient was 0.79, which showed that the scale has a good internal consistency. The split-half coefficient also indicated the scale and its subscale's high reliability. Forty partic-

ipants answered the questionnaire's questions again two weeks later to calculate the retest coefficient, and the obtained scores' correlation coefficients were calculated after conduction of the two tests. The results of the Cronbach's α , the split-half, and test-retest coefficients are presented in Table 2.

Table 2 shows that Cronbach's α coefficients were satisfactory and the data of all the test-retest and split-half's coefficients were significant. Therefore, it can be concluded that the BANPS has good internal consistency

Factor analysis

Exploratory factor analysis and confirmatory factor analysis were used to study the structure of the questions. The exploratory factor analysis was done using the principal component anal-

Table 1. Correlation coefficients between the subscales of *Brief Affective Neuroscience Personality Scales* with other tools

| Subscale | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|----|
| Play | 1 | | | | | | | | | | | | | |
| Anger | .10 | 1 | | | | | | | | | | | | |
| Seek | .38** | .22** | 1 | | | | | | | | | | | |
| Care | .64** | -.02 | .06 | 1 | | | | | | | | | | |
| Fear | .27** | .27** | -.01 | .15** | 1 | | | | | | | | | |
| Sadness | .07 | .32** | .18** | -.05 | .39** | 1 | | | | | | | | |
| Differentiating emotions | -.34** | -.59** | -.06 | -.35** | -.38** | -.27** | 1 | | | | | | | |
| Verbal sharing of emotions | 0.22** | -.29** | -.01 | .27** | .01 | -.26** | .17** | 1 | | | | | | |
| Not hiding emotions | -.01 | -.16** | -.21** | -.18** | .08 | -.05 | .33** | .12* | 1 | | | | | |
| Bodily awareness | .19** | -.33** | -.10 | .38** | -.27** | -.12* | .30** | .64** | .21** | 1 | | | | |
| Attending to others' emotions | -.15** | - | - | -.11* | .23** | -.04 | -.20** | -.23** | .01 | -.12* | 1 | | | |
| Analyses of emotions | .32** | .23** | .13* | .26** | .53** | .20** | -.48** | .02 | -.26** | -.18** | .30** | 1 | | |
| Negative | -.03 | .34** | .10 | .18** | .21** | .51** | -.57** | -.17** | -.41** | -.03 | .11* | .41** | 1 | |
| Positive | .45** | -.03 | .17** | -.03 | .21** | -.13* | .06 | .13* | .36** | -.13* | -.28** | .03 | -.53** | 1 |

** $p < 0.01$, * $p < 0.05$

Table 2. The mean, standard deviation, α , and test-retest coefficients of the *Brief Affective Neuroscience Personality Scale*

| Subscale | Mean /SD | α Coefficient | Test-retest | Split-half coefficient |
|----------|--------------|----------------------|-------------|------------------------|
| Play | 19/70 (4.50) | 0/81 | 0/69** | 0/70 |
| Anger | 18/80 (4/11) | 0/75 | 0/71** | 0/53 |
| Seek | 17/70 (3/22) | 0/75 | 0/58** | 0/47 |
| Care | 11/39 (3/13) | 0/79 | 0/72** | 0/51 |
| Fear | 17/76 (3/46) | 0/79 | 0/66** | 0/55 |
| Sadness | 19/56 (3/69) | 0/73 | 0/70** | 0/66 |

** $p < 0.01$

Table 3. The intersection rate of each question with the whole questionnaire, eigenvalue, and explanation percentage of each factor after orthogonal rotation based on principal component analysis *Brief Affective Neuroscience Personality Scales* model

| Subscale | Item | Factor load | subscale | Item | Factor load | subscale | Item | Factor load |
|---------------------------------------|-------|-------------|----------|------|-------------|----------|------|-------------|
| Play | 1 | 0/548 | Seek | 3 | 0/750 | Fear | 6 | 0/765 |
| | 9 | 0/772 | | 21 | 0/586 | | 15 | 0/750 |
| | 13 | 0/856 | | 25 | 0/935 | | 17 | 0/858 |
| | 19 | 0/851 | | 28 | 0/471 | | 23 | 0/493 |
| | 22 | 0/555 | | 31 | 0/456 | | 30 | 0/486 |
| | 29 | 0/891 | | 33 | 0/752 | | | |
| Eigenvalue | 3/55 | | 2/82 | | 2/79 | | | |
| The variance's explanation percentage | 10/75 | | 8/56 | | 8/47 | | | |
| Anger | 2 | 0/814 | Care | 4 | 0/820 | Sadness | 7 | 0/713 |
| | 5 | 0/527 | | 14 | 0/471 | | 8 | 0/637 |
| | 11 | 0/640 | | 16 | 0/845 | | 10 | 0/592 |
| | 20 | 0/904 | | 27 | 0/647 | | 12 | 0/571 |
| | 24 | 0/869 | | | | | 18 | 0/684 |
| | 26 | 0/709 | | | | | 32 | 0/789 |
| Eigenvalue | 2/86 | | 2/81 | | 2/70 | | | |
| The variance's explanation percentage | 8/67 | | 8/54 | | 8/19 | | | |

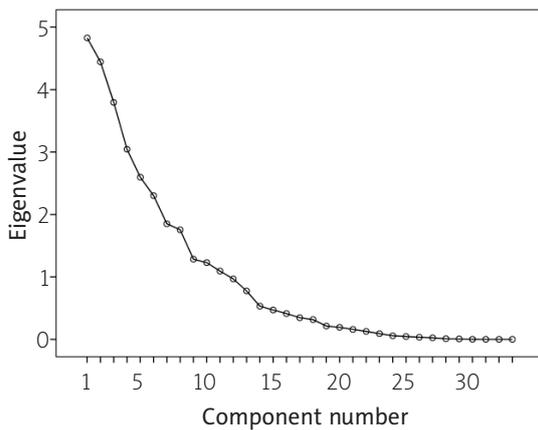


Fig. 1. The slope of the components (scree plot)

ysis, and orthogonal rotation was performed. The obtained value for *Kaiser-Meyer-Olkin Measure of Sampling Adequacy* (KMO) was 0.83 and *Bartlett's Test of Sphericity* ($\chi^2 = 458.681$) showed that factor analysis is possible. The intersection rate of each question with the whole questionnaire, factor loading matrix, and eigenvalue and variance percentage explained by any factor are presented in Table 3.

The slope of the components' results (scree plot) in Figure 1 and the analysis of the principal components showed the existence of six components with value greater than 1, which explained the 53/22 percent of variance. Data in Table 4 indicate that extracted factor loads are higher than 0.40 and distribution of the items in factors corresponds with the questionnaire's theoretical basic structure. In order to investigate

the fit of the six-factor structure of the BANPS, confirmatory factor analysis by maximum likelihood method and LISREL software were used (Jöreskog and Sörbom 2006).

The confirmatory factor analysis, using LISREL software, offered three levels of fit indices (Brown 2006; Schermelleh-Engel *et al.* 2003): (1) absolute fit indices such as χ^2 index and *Standardised Root Mean Square Residual* (SRMR), (2) parsimony goodness-of-fit index such as *Root Mean Square Error of Approximation* (RMSEA), and (3) *Comparative Fit Index* (CFI). There is controversy over the precise cutting scores of fit indices (Brown 2006; Schermelleh-Engel *et al.* 2003; Hair *et al.* 2009; Hu and Bentler 1999; Tabachnick and Fidell 2007). The more the scores of *Normed Fit Index* (NFI), *Relative Fit Index* (RFI), and *Goodness of Fit Index* (GFI) are closer to 1, the more they indicate the pattern's more desired fit. In the present study, the most valid fit scores have been used in order to assess the model's fit. SRMR < .08 shows a desired fit and SRMR < .10 indicates an acceptable fit, and the model is failed when SRMR > .10 (Hu and Bentler 1999). The index with value of RMSEA \leq .8 shows the model is good, and when the RMSEA is between 0.10 and 0.08, the model is acceptable. Eventually, CFI \geq .95 states the good fit of the model (Hu and Bentler 1999). Since the χ^2 statistic is sensitive to the sample size, to assess the overall fit of the model, the amount of χ^2 is calculated along with the degree of freedom (χ^2/df). $\chi^2/df < 2$ represents the model's good fit and when χ^2/df is around 3 the model is acceptable.

The amount of χ^2/df was 2.71, which is around 3, so the model's fit is acceptable. In addition to this, SRMR = .05 showed that the six-factor model's fit is acceptable and the fit indices of CFI = .95, NFI = .91, RFI = .93, AGFI = .92, and RMSEA = .04 represent the model's acceptable fit.

Conclusions

The *Brief Affective Neuroscience Personality Scale* is widely known to personality researchers. However, less attention has been paid to the brief form of BANPS. Hence, the present study was done to evaluate and validate the BANPS in normal samples.

The BANPS's factor analysis showed that the six-factor solution has a good fit. This finding is consistent with the studies that examine the BANPS scale's factor structure (Barrett *et al.* 2013). The findings also indicated that the six factor of Play, Anger, Seek, Care, Fear, and Sadness have a desirable internal reliability. Studying the BANPS's factor structure and patterns of factor loadings, using confirmatory factor analysis, represented similar results to what Barrett *et al.* (2013) obtained by six-factor solution. All the factor loadings were higher than 0.4.

Investigating the BANPS scale's reliability using α coefficients, test-retest coefficients, and split-half showed the scale's appropriate reliability. The Play, Anger, Seek, Care, Fear, and Sadness subscale's α coefficients were, respectively, 0.81, 0.75, 0.75, 0.79, and 0.73, and the amplitude of test-retest and split-half's coefficients suggested the BANPS's suitable reliability to measure Play, Anger, Seek, Care, Fear, and Sadness. The findings are consistent with the study of Barrett *et al.* (2013), who designed the original BANPS. Results indicate acceptable internal consistency, perhaps with some changes in the questionnaire because the results of factor analysis showed that a better questionnaire can be built for other samples.

The validity of the BANPS with the NAPAS (Joshanloo 2017) and *Emotion Awareness Questionnaire* (Rieffe *et al.* 2007) showed a positive correlation between the similar subscales of the BANPS with the subscales of NAPAS (Joshanloo 2017) and *Emotion Awareness Questionnaire* (Rieffe *et al.* 2007), which were significantly correlated with the last subscale. BANPS showed a positive correlation with the NAPAS (Joshanloo 2017) and *Emotion Awareness Questionnaire* (Rieffe *et al.* 2007, Mroczek and Kolarz 1998), and this corre-

lation was significant. This result demonstrated the divergent validity of the BANPS.

BANPS's psychometric properties in the present study were respectively consistent with the studies done in the original version (Barrett *et al.* 2013). According to what was said, the lack of a concise yet valid and useful tool to assess the affective neuroscience is the weakness of the affective neuroscience domain. As a result, it seems that, regardless of language and culture, and considering the pattern of factor loadings, which is similar to previous studies (Barrett *et al.* 2013), the BANPS scale is a useful tool in measuring the fundamental structures, which is more related to affective neuroscience. But it seems that careful consideration should be given to it in other samples. The psychometric properties of BANPS are applicable broadly and have the capacity to measure affective neuroscience, and can also be used in clinical and normal levels.

The reliability and validity analysis and confirmatory analysis demonstrated the desirable psychometric characteristics of BANPS, and the present study's findings are consistent with the original versions (Barrett *et al.* 2013). BANPS in normal population samples showed that it is a valid tool for assessing affective neuroscience. The calculated indices to evaluate the fit of the BANPS model suggested that SRMR, RMSEA, and (X^2/df) indices are the most valid fit indices (Brown 2006; Schermelleh-Engel *et al.* 2003; Hair *et al.* 2009; Hu and Bentler 1999; Tabachnick and Fidell 2007). This result is consistent with the original version of BANPS (Barrett *et al.* 2013). According to what was said, the present study was conducted among normal samples, and since it did not cover the all groups, the results should be treated with caution in generalising. It is also suggested that future studies examine the validity of BANPS by using other psychological means and clinical groups. The results of the present study indicate that BANPS has acceptable validity and reliability in normal samples. In addition, the questionnaire's factor structure was compliant with the designers' theory, and the five produced factors of the confirmatory factor analysis were consistent with the original version of BANPS.

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